

What is claimed is:

1. An impeller assembly to be installed in a pump having a pump housing for enclosing a pumping chamber, an inlet flange through which a fluid is to be introduced into the pumping chamber at a first pressure, an outlet flange through which the fluid is to be discharged from the pumping chamber at a second pressure, and a rotatable shaft that is to be operatively coupled to a pump driving device, the impeller assembly comprising:

a cutter bar to be coupled to the pump housing adjacent to the inlet flange; and

an impeller for imparting a centrifugal force on fluid entering the pumping chamber, the impeller being mountable on the shaft at a distance from the cutter bar when the cutter bar is coupled to the pump housing to form a clearance between the impeller and the cutter bar, wherein

the impeller comprises a concavity shaped to direct at least a portion of the fluid entering the pumping chamber generally toward the clearance between the impeller and the cutter bar.

2. The impeller assembly according to claim 1, wherein the impeller comprises a chopping blade that extends from the impeller in a direction generally parallel to a central axis of the impeller.

3. The impeller assembly according to claim 2, wherein the cutter bar is adjustably coupled to the pump housing between the inlet flange and the impeller to allow adjustment of the clearance between the chopping blade and the cutter bar.

4. The impeller assembly according to claim 2, wherein the chopping blade comprises a serrated portion that passes adjacent to the cutter bar during rotation of the impeller.
5. The impeller assembly according to claim 4, wherein the serrated portion comprises a plurality of teeth.
6. The impeller assembly according to claim 2, wherein the clearance is suitably sized such that rotation of the impeller adjacent to the cutting blade imparts a shearing force on objects entrained in the fluid entering the pumping chamber.
7. The impeller assembly of claim 1, wherein the cutter bar is to be coupled to the pump housing by a plurality of fasteners that are adjustable externally of the pump housing without disassembling the pump housing.
8. The impeller assembly according to claim 7, wherein the clearance between the impeller and the cutter bar is adjustable externally of the pump housing by adjusting the plurality of fasteners.
9. The impeller assembly according to claim 1, wherein the clearance is suitably sized such that rotation of the impeller adjacent to the cutting blade imparts a shearing force on objects entrained in the fluid entering the pumping chamber.
10. The impeller assembly according to claim 1, wherein the cutter bar is adjustably coupled to the pump housing between the inlet flange and the impeller to allow adjustment of the

clearance between the impeller and the cutter bar.

11. The impeller assembly according to claim 10, wherein the clearance between the impeller and the cutter bar is adjustable externally of the pump housing.

12. The impeller assembly according to claim 11, wherein the external adjustment of the clearance between the impeller and the cutter bar can be performed without disassembling the pump housing.

13. The impeller assembly according to claim 1 further comprising an inspection port provided to the pump housing, the inspection port permitting observation of the clearance between the impeller and the cutter bar.

14. The impeller assembly of claim 1, wherein the impeller comprises a surface in a plane extending radially from a central axis to oppose the inlet flange, and a chopping blade having a curved member normal to the plane, wherein

the curved member is shaped to create a vortex when rotated and comprises an edge to be rotated about the central axis adjacent to the cutting bar.

15. An impeller assembly to be installed in a pump having a pump housing for enclosing a pumping chamber, an inlet flange through which a fluid is to be introduced into the pumping chamber at a first pressure, an outlet flange through which the fluid is to be discharged from the pumping chamber at a second pressure, and a rotatable shaft that is to be operatively coupled to a pump driving device, the impeller assembly comprising:

a cutter bar to be adjustably coupled to the pump housing adjacent to the inlet flange; and

an impeller for imparting a centrifugal force on fluid entering the pumping chamber, the impeller being mountable on the shaft at a distance from the cutter bar when the cutter bar is coupled to the pump housing to form a clearance between the impeller and the cutter bar, wherein

a position of the cutter bar is adjustable relative to the impeller to provide adjustment of the clearance between the cutter bar and the impeller.

16. The impeller assembly according to claim 15, wherein the impeller comprises a chopping blade that extends from the impeller in a direction generally parallel to a central axis of rotation of the impeller.

17. The impeller assembly according to claim 16, wherein the chopping blade comprises a serrated portion to be rotated adjacent to the cutter bar during rotation of the impeller within the pumping chamber.

18. The impeller assembly according to claim 17, wherein the serrated portion comprises a plurality of teeth.

19. The impeller assembly according to claim 15, wherein the clearance is suitably sized such that rotation of the impeller adjacent to the cutting blade imparts a shearing force on objects entrained in the fluid entering the pumping chamber.

20. The impeller assembly according to claim 15, wherein the clearance between the impeller and the cutter bar is adjustable externally of the pump housing.

21. The impeller assembly according to claim 15, wherein the impeller comprises a surface in a plane extending radially from a central axis to oppose the inlet flange, and a chopping blade having a curved member normal to the plane, wherein

the curved member is shaped to create a vortex when rotated and comprises a distal edge to be rotated about the central axis adjacent to the cutting bar.

22. A pump comprising:

a pump housing for enclosing a pumping chamber, the pump housing having an inlet flange through which a fluid is to be introduced into the pumping chamber at a first pressure, and an outlet flange through which the fluid is to be discharged from the pumping chamber at a second pressure;

a rotatable shaft that is to be operatively coupled to a pump driving device;

a cutter bar; and

an impeller for imparting a centrifugal force on fluid being introduced into the pumping chamber, the impeller being mountable on the shaft at a distance from the cutter bar within the pump housing to form a clearance between the impeller and the cutter bar, wherein

the impeller comprises a concavity shaped to direct at least a portion of the fluid entering the pumping chamber generally toward the clearance between the impeller and the cutter bar as the impeller is rotated.

23. The pump according to claim 22, wherein the impeller comprises a chopper blade extending from the impeller in a direction to oppose the cutter bar within the pump housing.
24. The pump according to claim 23, wherein the chopper blade comprises a serrated portion that is to be rotated adjacent to the cutter bar as the impeller is rotated.
25. The pump according to claim 24, wherein the serrated portion comprises a plurality of teeth.
26. The pump according to claim 22, wherein the clearance is suitably sized such that rotation of the impeller adjacent to the cutter bar imparts a shearing force on objects entrained in the fluid being introduced into the pumping chamber.
27. The pump according to claim 22 further comprising a plurality of fasteners for coupling the cutter bar to the pump housing adjacent to the inlet flange.
28. The pump according to claim 27, wherein the plurality of fasteners are adjustable externally of the pump housing to adjust the clearance between the impeller and the cutter bar.
29. The pump according to claim 22 further comprising an inspection port to permit observation of at least the clearance between the impeller and the cutter blade.

30. The pump according to claim 29, wherein the inspection port is provided to the inlet flange.

31. A pump comprising:

a pump housing for enclosing a pumping chamber, the pump housing having an inlet flange through which a fluid is to be introduced into the pumping chamber at a first pressure, and an outlet flange through which the fluid is to be discharged from the pumping chamber at a second pressure;

a rotatable shaft that is to be operatively coupled to a pump driving device;

a cutter bar; and

an impeller for imparting a centrifugal force on fluid being introduced into the pumping chamber, the impeller being mountable on the shaft at a distance from the cutter bar within the pump housing to form a clearance between the impeller and the cutter bar, wherein

a position of the cutter bar is adjustable relative to the impeller within the pump housing to provide adjustment of the clearance between the cutter bar and the impeller.

32. The pump according to claim 31, wherein the impeller comprises a concavity shaped to direct at least a portion of the fluid in the pumping chamber generally toward the clearance between the impeller and the cutter bar.

33. The pump according to claim 31, wherein the impeller comprises a chopping blade that extends from the impeller in a direction generally parallel to a central axis of rotation of the impeller.

34. The pump according to claim 33, wherein the chopping blade comprises a serrated portion to be rotated adjacent to the cutter bar during rotation of the impeller within the pumping chamber.

35. The pump according to claim 34, wherein the serrated portion comprises a plurality of teeth.

36. The pump according to claim 31, wherein the clearance is to be adjusted to a suitable distance such that rotation of the impeller adjacent to the cutting blade imparts a shearing force on objects entrained in the fluid entering the pumping chamber.

37. The pump according to claim 31, wherein the clearance between the impeller and the cutter bar is adjustable externally of the pump housing.

38. The pump according to claim 31, wherein the impeller comprises a surface in a plane extending radially from a central axis to oppose the inlet flange, and a chopping blade having a curved member normal to the plane, wherein

the curved member is shaped to create a vortex when rotated and comprises a distal edge to be rotated about the central axis adjacent to the cutting bar.

39. A pump comprising:

a pump housing that defines a pumping chamber, the pump housing having an inlet flange through which a fluid is to be introduced into the pumping chamber at a first pressure, and an outlet flange through which the fluid is to be discharged from the pumping chamber at a second

pressure;

a rotatable shaft that is to be operatively coupled to a pump driving device;

a cutter bar;

an impeller for imparting a centrifugal force on fluid being introduced into the pumping chamber, the impeller being mountable on the shaft at a distance from the cutter bar within the pump housing to form a clearance between the impeller and the cutter bar; and

an inspection port for observing the clearance between the impeller and the cutter bar.

40. The pump according to claim 39, wherein the impeller comprises a chopping blade that extends from the impeller in a direction generally parallel to a central axis of rotation of the impeller.

41. The pump according to claim 40, wherein the chopping blade comprises a serrated portion to be rotated adjacent to the cutter bar during rotation of the impeller within the pumping chamber.

42. The pump according to claim 41, wherein the serrated portion comprises a plurality of teeth.

43. The pump according to claim 39, wherein the clearance is to be adjusted to a suitable distance such that rotation of the impeller adjacent to the cutting blade imparts a shearing force on objects entrained in the fluid entering the pumping chamber.

44. The pump according to claim 39, wherein the clearance between the impeller and the cutter bar is adjustable externally of the pump housing.

45. The pump according to claim 39, wherein the impeller comprises a surface in a plane extending radially from a central axis to oppose the inlet flange, and a chopping blade having a curved member normal to the plane, wherein

the curved member is shaped to create a vortex when rotated and comprises a distal edge to be rotated about the central axis adjacent to the cutting bar.

46. A method for converting a recessed impeller pump into a chopping pump, the recessed impeller pump having an existing impeller recessed within a pumping chamber, the method comprising:

removing an existing impeller and an existing inlet flange from the recessed impeller pump;

mounting a cutter bar to an inlet flange; and

mounting an impeller on a rotatable shaft of the recessed impeller pump, the impeller having a concavity shaped to direct at least a portion of fluid in the pumping chamber generally toward the cutter bar.

47. The method according to claim 46, wherein the step of mounting the cutter bar to the inlet flange comprises:

adjustably coupling the cutter bar to the inlet flange such that a clearance between the impeller and the cutter bar is adjustable.

48. The method according to claim 47 further comprising the steps of:

viewing the clearance between the impeller and the cutter blade through an inspection port; and

adjusting the clearance to a suitable size.

49. The method according to claim 46 further comprising the steps of:

mounting the inlet flange such that a clearance established between the cutter bar and the impeller within the pumping chamber.

50. A method for operating a pump, the pump comprising a pump housing enclosing a pumping chamber, an inlet flange through which a fluid can enter the pumping chamber, an outlet flange through which the fluid is discharged from the pumping chamber, and a cutter bar coupled adjacent to the inlet flange, the method comprising:

receiving a fluid through the inlet flange;

rotating an impeller adjacent to the cutter bar to chop objects entrained in the fluid; and

directing at least a portion of the fluid entering the pumping chamber generally toward a clearance between the impeller and the cutter bar.

51. The method according to claim 50 further comprising the steps of:

observing the clearance between the impeller and the cutter bar through an inspection port;
and

adjusting a position of the cutter bar to create a suitably sized clearance.